

IN THE CLAIMS

The following claim set replaces all prior versions, and listings, of claims in the application:

1. (Previously Presented) A gel polymer electrolyte for rechargeable batteries comprising:
 - (i) a gel polymer which is the reaction product of (A) a heterocyclic amine-group containing material, and (B) a halide-group or epoxy-group containing material, and
 - (ii) a liquid electrolyte which contains an amount of an ionic salt effective to achieve ionic conductivity of about 1×10^{-2} S/cm or less.
2. (Canceled)
3. (Previously Presented) The gel polymer electrolyte as in claim 1, wherein the halide-group containing material includes at least one halide group selected from chlorides, bromides and iodides.
4. (Currently Amended) The gel polymer electrolyte as in claim 1, wherein the material (B) is an epoxy-group containing material which includes at least one monomer, oligomer or polymer having at least one epoxy unit.
5. (Original) The gel polymer electrolyte as in claim 1, wherein the ionic salt is a lithium salt.

6. (Previously Presented) The gel polymer electrolyte as in claim 5, wherein the lithium salt is at least one selected from the group consisting of LiPF₆, LiAsF₆, LiClO₄, LiN(CF₃SO₂)₂, LiBF₄, LiCF₃SO₃ and LiSbF₆.

7. (Previously Presented) The gel polymer electrolyte as in claim 1, wherein the ionic salt is present in an amount effective to achieve an ionic conductivity of between about 1×10^{-3} to about 1×10^{-2} S/cm.

8. (Currently Amended) The gel polymer electrolyte as in claim 1, wherein the heterocyclic amine group containing material (A) includes at least one secondary or tertiary amine polymers, copolymers, oligomers and monomers each containing one member selected from the group consisting of 6- membered aromatic heterocycles, 5- membered fused aromatic heterocycles and aromatic tertiary amine compounds.

9. (Previously Presented) The gel polymer electrolyte as in claim 8, wherein the heterocyclic amine group containing material (A) includes at least one heterocyclic amine group containing compound selected from the group consisting of pyridines, pyridazines, pyrimidines, pyrazines, triazines, triazoles, thiazoles, and thiadiazoles.

10. (Currently Amended) The gel polymer electrolyte as in claim 1 or 9, wherein material (B) includes at least one material selected from the group consisting of an epoxy-group containing material and/or material (B) includes an epoxy-group containing material and/or an aromatic or non-aromatic halide material and an aromatic or non-aromatic halide material.

11. (Previously Presented) The gel polymer electrolyte as in claim 10, wherein the material (B) is an aromatic halide selected from polymers, copolymers or monomers containing halomethyl benzene, halomethyl naphthalene, halomethyl biphenyl, bis(halomethyl) benzene, bis(halomethyl) naphthalene, bis(halomethyl) biphenyl, tris(halomethyl) benzene, tris(halomethyl) naphthalene, tris(halomethyl) biphenyl,

tetrakis(halomethyl) benzene, tetrakis(halomethyl) naphthalene, tetrakis(halomethyl) biphenyl, halomethylstyrene.

12. (Previously Presented) The gel polymer electrolyte of claim 11, wherein the halomethyl of the aromatic halide is chloromethyl, bromomethyl or iodomethyl.

13. (Previously Presented) The gel polymer electrolyte of claim 10, wherein the material (B) is a non-aromatic halide selected from C2 or greater alkanes which include diiodo, triodo or tetraiodo groups.

14. (Previously Presented) The gel polymer electrolyte as in claim 10, wherein material (B) is an epoxy-group containing material which is at least one selected from the group consisting of 3,4-epoxycyclohexylmethyl-3',4'-epoxycyclohexane carboxylate, glycidyl dodecafluoroheptylether, polypropylene glycol diglycidyl ether, glycidyl dodecafluoroheptylether, butadiene diepoxide, butanediol diglycidyl ether, cyclo hexene oxide, cyclopentene oxide, diepoxy cyclooctane, ethylene glycol diglycidyl ether and 1,2-epoxy hexane.

15. (Previously Presented) The gel polymer electrolyte of claim 1, wherein the gel polymer is present, based on the total weight of the gel polymer electrolyte, in an amount between about 1 wt.% to about 30 wt.%.

16. (Previously Presented) The gel polymer electrolyte of claim 1 or 15, wherein the liquid electrolyte is present, based on the total weight of the gel polymer electrolyte, in an amount between about 30 wt.% to about 99 wt.%.

17. (Previously Presented) The gel polymer electrolyte of claim 1, wherein the liquid electrolyte is present, based on the total weight of the gel polymer electrolyte, in an amount of about 95 wt.% or greater.

18. (Previously Presented) A gellable electrolyte for a rechargeable battery comprising (i) a liquid gelling agent mixture of (A) a heterocyclic amine-group containing

material, (B) a halide-group or epoxy-group containing material, and (ii) a liquid electrolyte which contains an amount of an ionic salt effective to achieve ionic conductivity of about 1×10^{-2} S/cm or less.

19. (Original) The gellable electrolyte as in claim 18, wherein the halide-group containing material includes at least one halide group selected from chlorides, bromides and iodides.

20. (Currently Amended) The gellable electrolyte as in claim 18, wherein the material (B) is an epoxy-group containing material which includes at least one monomer, oligomer or polymer having at least one epoxy unit.

21. (Original) The gellable electrolyte as in claim 18, wherein the ionic salt is a lithium salt.

22. (Original) The gellable electrolyte as in claim 21, wherein the lithium salt is at least one selected from the group consisting of LiPF₆, LiAsF₆, LiClO₄, LiN(CF₃SO₂)₂, LiBF₄, LiCF₃SO₃ and LiSbF₆.

23. (Original) The gellable electrolyte as in claim 18, wherein the ionic salt is present in an amount effective to achieve an ionic conductivity of between about 1×10^{-3} to about 1×10^{-2} S/cm.

24. (Previously Presented) The gellable electrolyte as in claim 18, wherein the heterocyclic amine group containing material (A) includes at least one secondary or tertiary amine polymers, copolymers, oligomers and monomers each containing one member selected from the group consisting of 6- membered aromatic heterocycles, 5- membered fused aromatic heterocycles and aromatic tertiary amine compounds.

25. (Previously Presented) The gellable electrolyte as in claim 24, wherein the heterocyclic amine group containing material (A) includes at least one heterocyclic

amine group containing compound selected from the group consisting of pyridines, pyridazines, pyrimidines, pyrazines, triazines, triazoles, thiazoles, and thiadiazoles.

26. (Original) The gellable electrolyte as in claim 18 or 25, wherein material (B) includes an epoxy-group containing material and/or an aromatic or non-aromatic halide material.

27. (Original) The gellable electrolyte as in claim 26, wherein the material (B) is an aromatic halide selected from polymers, copolymers or monomers containing halomethyl benzene, halomethyl naphthalene, halomethyl biphenyl, bis(halomethyl) benzene, bis(halomethyl) naphthalene, bis(halomethyl) biphenyl, tris(halomethyl) benzene, tris(halomethyl) naphthalene, tris(halomethyl) biphenyl, tetrakis(halomethyl) benzene, tetrakis(halomethyl) naphthalene, tetrakis(halomethyl) biphenyl, halomethylstyrene.

28. (Original) The gellable electrolyte of claim 27, wherein the halomethyl of the aromatic halide is chloromethyl, bromomethyl or iodomethyl.

29. (Previously Presented) The gellable electrolyte of claim 26, wherein the material (B) is a non-aromatic halide selected from C2 or greater alkanes which include diiodo, triodo or tetraiodo groups.

30. (Previously Presented) The gellable electrolyte as in claim 26, wherein material (B) is an epoxy-group containing material which is at least one selected from the group consisting of 3,4-epoxycyclohexylmethyl-3',4'-epoxycyclohexane carboxylate, glycidyl dodecafluoroheptylether, polypropylene glycol diglycidyl ether, glycidyl dodecafluoroheptylether, butadiene diepoxide, butanediol diglycidyl ether, cyclo hexene oxide, cyclopentene oxide, diepoxy cyclooctane, ethylene glycol diglycidyl ether and 1,2-epoxy hexane.

31. (Previously Presented) The gellable electrolyte of claim 18, wherein the gelling agent is present, based on the total weight of the gellable electrolyte, in an amount between about 1 wt.% to about 30 wt.%.

32. (Previously Presented) The gellable electrolyte of claim 18 or 31, wherein the liquid electrolyte is present, based on the total weight of the gellable electrolyte, in an amount between about 30 wt.% to about 99 wt.%.

33. (Previously Presented) The gellable electrolyte of claim 18, wherein the liquid electrolyte is present, based on the total weight of the gellable electrolyte, in an amount of about 95 wt.% or greater.

34. (Original) The gellable electrolyte of claim 33, wherein the ionic salt is present in an amount between about 0.5M to 2.0M.

35. (Previously Presented) A rechargeable battery comprising an anode, a cathode, a microporous separator separating said anode and said cathode, and a gel polymer electrolyte according to any one of claims 1 and 3-9.

36. (Original) The rechargeable battery of claim 35 which exhibits a pre-charge voltage of at least about 0.3 V or greater.

37-61 (Canceled)

62. (Previously Presented) A gel polymer electrolyte for rechargeable batteries comprising:

- (i) a gel polymer which is the reaction product of (A) a vinylpyridine compound, and (B) an epoxy-group containing material, and
- (ii) a liquid electrolyte which contains an amount of an ionic salt effective to achieve ionic conductivity of about 1×10^{-2} S/cm or less.

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63. (Previously Presented) The gel polymer electrolyte as in claim 62, wherein the vinylpyridine compound (A) is poly(2-vinyl-pyridine-co-styrene), and the epoxy-group containing material is butanediol diglycidyl ether.

64. (Previously Presented) A rechargeable battery comprising an anode, a cathode, a microporous separator separating said anode and said cathode, and a gel polymer electrolyte according to claim 62 or 63.